

# Frontiers

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**Digital will  
shape the future  
of oil and gas**



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Oil and gas companies are currently grappling with a new era of disruption. Over the past several years, oil and gas companies have dealt with price shocks, changing consumer sentiment and vast technological advancements both within and outside the industry. With commodity prices stabilizing, now is the time for oil and gas companies to invest in the potential of digital throughout the value chain and to drive innovation within and integrated across operations, the supply chain and finance.

A successful digital implementation starts with a comprehensive, integrated digital strategy that alleviates the risk of creating technology silos that are not utilized and integrated into the work environment. In addition, it should address the returns through a robust business case that can be tracked through the transformation journey. Without this in place, companies risk investing scarce resources without realizing the benefits. Five critical digital themes are converging to disrupt the sector today – creating a significant opportunity for oil and gas companies:

**1 Intelligent Automation (IA)**  
Businesses have been using robotics for some time to help human transactional processing become more automated. But by adding the power of artificial intelligence to robotic process automation, businesses can employ critical thinking and quality checks among other traditional human processes, which have the potential to automate entire functions and free up time for engineers to focus on engineering.

**2 Data-driven decisions**  
Big data, analytical platforms and new cognitive sciences are converging to allow companies to analyze data in ways that have not been possible until now. Oil and gas companies produce troves of data in their daily operations. More sophisticated data algorithms along with predictive analytics, machine learning and insights can help oil and gas businesses to increase operational efficiency by innovating the way in which they maintain and upgrade assets, identify the best areas and ways to drill and complete wells at lower costs, decrease unplanned downtime, optimize production and improve refinery and chemicals operations.

**3 Industrial Internet of Things (IIoT)**  
Companies can benefit from automation monitoring and diagnostics by connecting field assets and equipment through the use of sensors. Edge computing can further augment real-time analysis of incoming data from critical assets that can be performed on the cloud. Through the use of IIoT technologies and integrating them into existing infrastructure, companies can build real-time insights on the operation of assets and whole processes, thereby helping to optimize utilization and maintenance planning.

**4 Next generation platforms**  
More than twenty years ago, oil and gas companies dedicated a lot of time and resources to implementing large Enterprise Resource Planning (ERP) systems, which now represent the enterprise digital core of how businesses are run today. By leveraging IA, analytics and IIoT in tandem with companies' existing ERP systems, they can move to a future state that will improve operational efficiency, provide integrated insights and ultimately the help bottom line. Oil and gas companies are in a unique position to take on the combination of digital technologies and ERP platforms to drive efficiency and agility in the business. The ability to bring together data in a single platform from disparate systems that can then be used for analysis and decision-making helps companies overcome the barrier of integration and data silos across the organization.

**5 Blockchain**  
A distributed ledger that allows companies to transact business without the need of a central authority. Due to the nature of the technology, security is inherent and built into the transaction. This technology could allow oil and gas companies to establish better control of data and information and provide consistency – particularly around the accounting of hydrocarbons, supply and demand, and materials movement. In addition, the secure mesh network that blockchain provides can be integrated into an IIoT platform where an array of devices can communicate securely and instantly without the need for centralized servers. As the sector increasingly leverages sensor technology across upstream and downstream assets, blockchain technology can help compress process time and reactivity to an event by connecting assets directly to services providers without the need for human intervention. Blockchain could also transform the supply chain through a smart contracting process that provides a secure form of collaboration across multiple parties, while even allowing for increased process efficiency and compliance.



As companies increase their digital footprint, their exposure to increasingly sophisticated cyber attacks will also rise. It is critical businesses take steps to defend their operations by examining their digital ecosystem and adopting a robust cybersecurity strategy. According to the 20th annual *EY Global Information Security Survey (GISS)*, 50% of those surveyed increased their cybersecurity budget over the past 12 months, and 62% will increase it further over the next 12 months.

Another key consideration in adopting these new best-in-class technologies is to account for how digitization will impact the existing workforce. While digitizing tasks drives performance and reduces risks associated with human error, it also frees people to focus on more strategic and value-added activities. Notably, 60% of respondents to a [recent EY survey of global oil and gas executives](#) stated technology advances will require them to retrain and redeploy existing employees, while 53% stated it will create opportunities and necessitate hiring new talent. Career paths and operating models will inevitably change, but, ultimately, it will be an

organization's own people that will enable its digital program – and businesses will need to make sure they have the skills and capabilities to do so.

Digital will impact competition dynamics across the oil and gas sector as new business models evolve and insurgent digital first companies vie for a place in the market. Large companies that currently do everything from drilling and production to managing the supply chain may, in the future, adopt a digital platform, allowing them to outsource multiple services to niche players. Should a smart contracting company manage contracts between suppliers and operators? Should businesses defer to a third party that is truly an expert in production? In time, this could give rise to new market players and entrants that don't exist today. Ultimately, the adoption of new technologies will help support the oil and gas industry's focus on capital and operational efficiency to reduce costs in the short-term, and equip businesses with the agility and digital sophistication required to succeed in an increasingly disrupted future. **F**

**About *Frontiers*:** In order not just to survive, but thrive, oil and gas companies and their executives must look around every corner, into the distance, to forecast the industry's next frontier. There are many weak signals that, if they gain velocity, could have major implications on the industry. But what happens when companies are too busy managing the current environment, especially in today's lower-for-longer landscape, to focus on the horizon? And how can companies prepare for those weak signals with an eye on the present and toward the future? Please follow along as we regularly analyze different energy futures and weak signals impacting the industry through our *Frontiers* series. If you are interested in receiving future *Frontiers* editions, please contact [usenenergy@ey.com](mailto:usenenergy@ey.com).

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